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AN ANALYSIS OF MARKET INSPECTION REPORTS ON SPOILAGE OF CANTALOUPS AND RELATED MELONS

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AN ANALYSIS OF MARKET INSPECTION REPORTS ON SPOILAGE OF CANTALOUPS[1] AND RELATED MELONS

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Bureau of Plant Industry

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[1] Although a strict taxonomic usage of the term "cantaloup" would limit it to members of *Cucumis melo* var. *cantalupensis* it has come to be generally used in the United States to designate the small green-skinned, netted muskmelons, *C. melo* var. *reticulatus*, and it is employed in the latter sense in this publication. "Muskmelon" is a group name used to designate all kinds of melons other than watermelons and includes cantaloup, Honey Dew, Honey Ball, Casaba, Persian, Spanish, and other related melons.

INTRODUCTION

Since 1931 the writer has been engaged in a study of the market diseases of fruits and vegetables at New York City. During the early years of the work considerable attention was given to the decays of cantaloups and related melons. The results of these studies have already been published.[2/] More recently the market spoilage of melons has been approached by an entirely different method. Through the courtesy of the United States Agricultural Marketing Administration an opportunity has been afforded to examine food-products inspection certificates that have been issued for the inspection of melons. The present paper is therefore based on a study of nearly 10,000 inspections made at New York City during the years 1933, 1934, 1935, and 1941. There is also included a summary of nearly 4,000 inspections made at many different markets throughout the United States during the much earlier period of 1922-28, inclusive.[3/]

INSPECTIONS OF 1933, 1934, 1935, AND 1941

Methods. Fortunately for the purposes of this study, there had been organized during 1933 a group of produce receivers who arranged to have inspections made regularly on most of their cars at the time of unloading in New York City. A group of licensee inspectors gave full time to this work and the inspection certificates were filed separately. Since August, 1933, there has thus been available a set of certificates that includes condition reports on somewhat over half of the cars of cantaloups, Honey Dew, Honey Ball, and mixed melons received annually at New York from the 3 States of California, Colorado, and Arizona. The certificates examined and summarized for the years 1933, 1934, 1935, and 1941 were exclusively from this lot, and included all of the inspections made on melons of this type received during the period under consideration from these 3 States by the group of receivers noted above.

2/ Wiant, James S. Investigations of the market diseases of cantaloups and Honey Dew and Honey Ball melons. U. S. Dept. Agr. Techn. Bull. 573. 1937

3/ Reports of similar studies by others include the following:
Rose, D. H. Diseases of apples on the market. U.S. Dept. Agr. Bull. 1253. 1924
Rose, D. H. Diseases of strawberries on the market. U. S. Dept. Agr. Circ. 402. 1926
Stevens, N. E. Market diseases of strawberries from the southeastern States, 1926 to 1930. U. S. Dept. Agr. Circ. 219. 1932
Stevens, N. E. Spoilage of tomatoes in transit, as shown by inspection certificates, 1922 to 1930. U. S. Dept. Agr. Circ. 245. 1932
Brooks, C. Spoilage of stone fruits on the market. U. S. Dept. Agr. Circ. 253. 1933

For a high percentage of the inspections the distinguishing marks on the container labels were not sufficiently inclusive to enable the determination of the State of origin by the inspector. This was due to the fact that many western shippers pack melons in season from more than one of the 3 States involved. The same brand label is used throughout and frequently the only statement of location printed on it refers to the main office which may be in a different State from the one in which the melons were grown and packed. No attempt was made, therefore, to summarize the inspection records by States of origin.

Upon examination of the certificates it was found that in many instances the inspector had recorded more than one type of decay on a single certificate. For example, the certificate might read "....6 per cent decay. Decay is rhizopus and fusarium rots." During the tabulation of the inspection data the amount of decay occurring in the various combinations of rots was recorded separately. However, in preparing the summary tables it appeared that the distribution of the several rots could best be shown if the combinations of decay were broken down into their component rots. The following method was therefore adopted: Where the different rots appeared in combination it was assumed that on the average each was of equal importance as a factor of spoilage. Thus if 24 carlots were found to show an average of 6% total decay consisting of rhizopus and fusarium rots, 24 half-carlots were listed as affected with 6% rhizopus rot and 24 half-carlots with 6% fusarium rot. If the carlot total for a given combination of rots was an odd number, the decay cited first in the combination as it appeared on the certificate was listed alone in one carlot, thus avoiding fractions in totals of carlots. Combinations of 3 different decays were handled similarly.

Although having the advantage of showing the average spoilage per car in terms of the specific rots responsible, the method does not reveal the complete distribution of a given rot throughout the entire number of carlots in which it occurred in combination with other decays. The complete distribution is therefore presented in full in the text.

Where both surface mold and decay occurred in a given carlot the inspector recorded separately the percentage affected with each. If a given melon was affected with both mold and decay it was scored only under decay (the more serious of the two defects). Total spoilage can thus be determined by adding the percentage affected with mold to the percentage affected with decay.

Results -- Cantaloups. Results from 3294 carlot inspections of cantaloups are summarized in Table 1 by type of decay and mold.

The inspections for 1933 were begun in August so that the 389 carlots for that year represented only 18% of the total New York City receipts[4] from California, Arizona, and Colorado.

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[4] Reports issued in mimeographed form by the United States Agricultural Marketing Service show that a total of 7982 carlots of cantaloups from Arizona, California, and Colorado were unloaded at New York City during

Table 1.
Decay and Mold in Carlots of Cantaloups -- 1933, 1934, 1935 and 1941
(Table continued on facing page)

YEAR	TOTAL NUMBER OF CAR-LOTS IN-SPEC-TED	CARLOTS WITH DECAY									
		Alternaria Rot		Cladosporium Rot		Fusarium Rot		Phytophthora Rot		Rhizopus Rot	
		Number of carlots	Average percentage of Decay	Number of carlots	Average percentage of Decay	Number of carlots	Average percentage of Decay	Number of carlots	Average percentage of Decay	Number of carlots	Average percentage of Decay
1933	389	57	9.1	--	--	21	12.5	--	--	72	6.4
1934	1053	127	7.7	--	--	121	5.8	--	--	39	4.4
1935	827	76	4.1	--	--	28	4.4	--	--	49	5.6
1941	1025	--	--	51	10.2	225	4.8	6	7.8	347	3.9
Total: or Aver-age	3294	260	6.9	51	10.2	395	5.5	6	7.8	507	4.4

Those inspected during 1934, 1935, and 1941 comprised approximately half of the cantaloups received from the 3 States during those years.

Rhizopus rot and alternaria rot were nearly equally of first importance in 1933. The former occurred in a somewhat greater number of carlots but

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4/ the 4 years 1933, 1934, 1935, and 1941. These represented approximately 58% of total cantaloup unloads from all States.

Honey Dew melons during the same period totalled 7605 carlots from the 3 States. These comprised practically all of the domestic Honey Dew unloads at New York City.

Mixed carlots of melons and carlots of Honey Ball melons unloaded at New York from the 3 States totalled 3816, nearly 70% of which were Honey Balls. These constituted practically all of the mixed carlots and approximately 87% of all Honey Ball melons that were unloaded at New York City during this period.

The melons found in mixed carlots were chiefly either cantaloups, Honey Dews, or Honey Balls, although other types of muskmelons such as Persian melons and Casaba melons were also shipped in mixed carlots along with the other 3 types.

Of all cantaloups from California, Arizona, and Colorado that were unloaded at New York City during the 4 years, 71% were from California, 17% from Arizona, and 12% from Colorado. Similarly with Honey Dew melons, 83% were from California, 10% from Colorado, and 7% from Arizona. Practically all Honey Ball melons and carlots of mixed melons were from California.

Table 1 conc.
Decay and Mold in Carlots of Cantaloups -- 1933, 1934, 1935 and 1941

YEAR	TOTAL NUMBER OF CAR-LOTS IN-SPEC-TED	CARLOTS WITH DECAY		CARLOTS WITH MOLD				TOTAL OF DECAY AND MOLD	
		Unclassified		Mold not associated with decay		Mold associated with decay			
		Number of carlots	Average percentage of decay	Number of carlots	Average percentage of mold	Number of carlots a/	Average percentage of mold	Number of carlots b/	Average percentage of decay and mold
1933	389	24	10.4	82	10.9	54	15.7	256	12.6
1934	1053	19	7.3	106	10.2	221	19.8	412	18.0
1935	827	--	--	137	5.5	149	10.7	290	10.6
1941	1025	18	2.3	50	6.5	347	14.1	697	11.8
Total: or Average	3294	61	7.0	375	8.1	771	15.2	1655	13.3

a/ Total number of carlots in which both mold and decay occurred.
b/ Does not include the number of carlots listed under "mold associated with decay."

the average incidence of decay was lower than in those affected with alternaria rot. Fusarium rot was found in the fewest of the carlots having decay although the percentage per carlot was the highest.

Alternaria rot, followed closely by fusarium rot, was the most important decay in 1934. Rhizopus rot was the least so of the 3 decays.

Again in 1935 alternaria rot was responsible for more decay than was any other rot. Rhizopus rot was next in importance and fusarium rot was the least prevalent of the 3.

Over 1/3 of the carlots inspected in 1941 averaged 3.9% decay from rhizopus rot. Nearly 1/4 averaged 4.8% decay from fusarium rot. Alternaria rot was not reported. Cladosporium rot, which was not reported during 1933-35, was found in a number of carlots in 1941. Phytophthora rot, likewise not reported during 1933-35, was recorded for 6 carlots.

On the basis of a 4-year average the order of prevalence was rhizopus rot, fusarium rot, alternaria rot, cladosporium rot, and phytophthora rot. Decay per car, caused by each of these individual organisms, averaged for the 4 years, ranges from 4.4 to 10.2%.

During the 4 years 667 carlots were noted in which combinations of either 2 or 3 different rots were found associated in the same carlot. By including in the computation the occurrence of each kind of rot either alone or in association with others, it was found that of the 1280 total carlots in which decay was present rhizopus rot occurred in 49%, fusarium rot in 39%, alternaria rot in 5%, cladosporium rot in 7%, and phytophthora rot in 1%.

Carlots in which mold alone was reported varied in number from 50 in 1941 to 137 in 1935 and totalled 375 carlots for the 4 years. These represented approximately 11% of all carlots. An average of 8.1% of the cantaloups in them were affected with mold.

The number of carlots in which mold was found associated with decay varied from 54 in 1933 to 347 in 1941 and totalled 771 or nearly 1/4 of the carlots inspected during the 4 years. The extent to which it occurred was 15.7% of the cantaloups in the cars of 1933, 19.8% in those of 1934, 10.7% in 1935 and 14.1% in 1941, with an average of 15.2% for the 4 years.

The average percentage of cantaloups affected with mold and with decay respectively has been computed on the basis of both total carlots showing either defect and of total carlots inspected. This is summarized in Table 2. During each year the number with mold or decay constituted a considerable part of the total number inspected with an average for the 4 years of slightly over 1/2 the carlots so affected. In these affected cars, 4.3% of the melons were affected with decay and 9.0% with mold. Expressed in another way, 2.2% of all cantaloups inspected were decayed and an additional 4.5% were moldy, a total of 6.7% for the 2 defects.

Results -- Honey Dew Melons. A total of 4181 carlots of Honey Dew melons were inspected. The results are summarized in Table 3 by types of decay and mold. The 800 carlots of 1933 constituted approximately 46% of the total New York City receipts of domestic Honey Dews[5]. During each of the other 3 years the percentage was even higher so that for the 4 years as a whole approximately 55% of the domestic Honey Dews received at this market were inspected.

During 1933 and 1934 rhizopus rot was the most important decay found. Alternaria rot was next in importance. Fusarium rot was reported in much fewer carlots than were the other 2 decays.

Rhizopus rot and alternaria rot were the most important decays in 1935. The former occurred in more cars than the latter but affected fewer melons per car. Phytophthora rot, not reported in the inspections of 1933 and 1934, was of next importance, followed by cladosporium rot, likewise not reported during the 2 preceeding years. A few cars were found affected with fusarium rot.

In 1941 the several decays occurred in the following order of decreasing importance - rhizopus rot, cladosporium rot, fusarium rot, phytophthora rot, and alternaria rot. Of chief interest was the small amount of alternaria rot and the large amount of cladosporium rot together with the increasing importance of fusarium rot.

The order of prevalence for the 4-year total was rhizopus rot, alternaria rot, cladosporium rot, fusarium rot, and phytophthora rot. Decay per car caused by each of these individual organisms, averaged for the 4 years,

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[5] See Footnote 4.

Table 2.
Summary of decay and mold in carlots of Cantaloups, Honey Dew, Honey Ball and Mixed Melons -- 1933, 1934, 1935 and 1941

YEAR AND TYPE OF MELON	TOTAL CARLOTS INSPECTED				CARLOTS WITH DECAY OR MOLD				CAR-LOTS WITH NO DECAY OR MOLD
	NUMBER	Decay: Average percentage of melons affected per car	Mold: Average percentage of melons affected per car	Total of Decay and mold: Average percentage of melons affected per car	NUMBER	Decay: Average percentage of melons affected per car	Mold: Average percentage of melons affected per car	Total of Decay and mold: Average percentage of melons affected per car	
Cantaloup									
1933	389	3.8	4.5	8.3	256	5.8	6.8	12.6	133
1934	1053	1.9	5.2	7.1	412	4.8	13.2	18.0	641
1935	827	0.8	2.9	3.7	290	2.5	8.1	10.6	537
1941	1025	2.9	5.1	8.0	697	4.3	7.5	11.8	328
Total or average for Cantaloup	3294	2.2	4.5	6.7	1655	4.3	9.0	13.3	1639
Honey Dew Melon									
1933	800	3.8	0.2	4.0	422	7.2	0.4	7.6	378
1934	1124	1.2	0.2	1.4	303	4.7	0.4	5.1	821
1935	1335	1.2	0.3	1.5	391	4.2	0.9	5.1	944
1941	922	2.8	Trace	2.8	612	4.3	Trace	4.3	310
Total or average for Honey Dew Melon	4181	2.1	0.2	2.3	1728	5.0	0.4	5.4	2453
Honey Ball & mixed melons									
1933	283	4.5	3.0	7.5	159	8.0	5.3	13.3	124
1934	768	2.0	3.1	5.1	340	4.4	7.0	11.4	428
1935	748	1.1	1.3	2.4	267	3.0	3.7	6.7	481
1941 Mixed melons	271	0.8	1.0	1.8	127	1.8	2.0	3.8	144
1941 Honey Balls	345	3.2	2.7	5.9	124	8.9	7.5	16.4	221
Total or average for Honey Ball and Mixed melons	2415	2.1	2.2	4.3	1017	4.8	5.3	10.1	1398
Total or average all Years for all Melons	9890	2.1	2.1	4.2	4400	4.7	4.8	9.5	5490

Table 3.
Decay and Mold in carlots of Honey Dew Melons -- 1933, 1934, 1935 and 1941
(Table continued on facing page)

YEAR	TOTAL Number OF CARLOTS INSPECTED	CARLOTS WITH DECAY									
		Alternaria Rot		Cladosporium Rot		Fusarium Rot		Phytophthora Rot		Rhizopus Rot	
		Number of carlots	Average percentage of Decay	Number of carlots	Average percentage of Decay	Number of carlots	Average percentage of Decay	Number of carlots	Average percentage of Decay	Number of carlots	Average percentage of Decay
1933	800	110	8.7	--	--	17	13.7	--	--	246	6.9
1934	1124	110	6.5	--	--	34	3.3	--	--	140	4.0
1935	1335	105	5.4	21	8.1	10	4.8	58	3.9	174	3.7
1941	922	2	5.5	172	5.9	63	6.9	12	3.8	343	3.2
Total or Average	4181	327	6.9	193	6.1	124	6.6	70	3.9	903	4.4

Table 4.
Decay and Mold in Carlots of Honey Ball Melons and Mixed Melons --
1933, 1934, 1935 and 1941
(Table continued on facing page)

1933	283	34	11.1	--	--	17	13.5	--	--	75	6.9
1934	768	81	7.0	--	--	63	3.8	--	--	138	4.8
1935	748	85	2.9	3	4.3	14	5.1	3	4.3	102	3.3
1941 Mixed melons	271	--	--	20	4.3	30	1.7	--	--	69	1.3
1941 Honey Ball	345	--	--	49	11.6	3	2.3	--	--	64	8.2
Total or Average	2415	200	5.9	72	9.2	127	4.7	3	4.3	448	4.8

ranges from 3.9 to 6.9%.

Combinations of either 2 or 3 different rots found associated in the same carlot were recorded from a total of 804 carlots during the 4 years. Computed on the basis of occurrence either alone or in combination with other rots it was determined that for all 1666 carlots in which decay was present, rhizopus rot was found in 64%, alternaria rot in 25%, cladosporium rot in 17%, fusarium rot in 11%, and phytophthora rot in 6%.

Mold was of much less importance in Honey Dew melons than in cantaloups. For the 4 years as a whole 62 carlots were noted in which mold occurred as

Table 3 conc.
Decay and Mold in carlots of Honey Dew Melons -- 1933, 1934, 1935 and 1941

YEAR	TOTAL NUMBER OF CAR-LOTS IN-SPEC-TED	CARLOTS WITH DECAY Unclassified: Number of carlots	CARLOTS WITH DECAY Unclassified: Average per-centage of decay	CARLOTS WITH MOLD Mold not associated with decay: Number of carlots	CARLOTS WITH MOLD Mold not associated with decay: Average per-centage of mold	CARLOTS WITH MOLD Mold associated with decay: Number of carlots a/	CARLOTS WITH MOLD Mold associated with decay: Average per-centage of mold	TOTAL OF DECAY AND MOLD: Number of carlots b/	TOTAL OF DECAY AND MOLD: Average per-centage of decay and mold
1933	800	24	5.9	25	4.9	11	6.7	422	7.6
1934	1124	6	5.2	13	4.8	8	8.4	303	5.1
1935	1335	--	--	23	6.5	33	6.1	391	5.1
1941	922	19	1.2	1	3.0	2	4.5	612	4.3
Total or Average	4181	49	4.0	62	5.5	54	6.5	1728	5.4

Table 4 conc.
Decay and Mold in Carlots of Honey Ball Melons and Mixed Melons -- 1933, 1934, 1935 and 1941

1933	283	19	7.7	14	8.8	49	14.7	159	13.3
1934	768	7	4.9	51	9.0	139	13.8	340	11.4
1935	748	--	--	60	4.6	101	7.1	267	6.7
1941 Mixed melons	271	--	--	8	5.6	27	7.6	127	3.8
1941 Honey Ball	345	--	--	8	5.1	66	13.5	124	16.4
Total or Average	2415	26	7.0	141	6.7	382	11.6	1017	10.1

a/ Total number of carlots in which both mold and decay occurred.
b/ Does not include the number of carlots listed under "mold associated with decay."

the only defect, with an average of 5.5% of the melons affected.

Mold was found associated with decay in a total of 54 carlots. The extent to which it occurred was 6.7% of the melons in 1933, 8.4% in 1934, 6.1% in 1935 and 4.5% in 1941 with an average of 6.5% for the 4 years.

The comparatively slight importance of mold in the carlots of Honey Dew melons inspected is further shown by the data in Table 2. Computed on the basis of all carlots affected, total decay amounted to an average of 5.0% of the melons. On the basis of all carlots inspected there was a 2.1% spoilage from decay while only 0.2% were affected with mold.

Results -- Honey Ball and Mixed Melons. A summary of inspections made on 2415 carlots of Honey Ball melons and mixed melons is found in Table 4. Only for 1941 are the data in the table recorded separately for Honey Balls.

The inspections of 1933 covered approximately 32% of total New York City receipts[6] of Honey Ball and mixed melons while during each of the other years an average of approximately 73% were inspected.

During each of the first 3 years rhizopus rot was the most important decay present, alternaria rot was second in importance, and fusarium rot was the least prevalent of the 3 decays. Cladosporium rot and phytophthora rot were each recorded from 3 cars in 1935.

Rhizopus rot was the most important decay in mixed carlots of 1941. Fusarium rot and cladosporium rot were of nearly equal importance; the former was found in a greater number of carlots but the percentage of melons affected per car was considerably lower than in those affected with cladosporium rot. Considered on this basis, the latter was of approximately equal importance with rhizopus rot.

In the carlots of Honey Ball melons inspected during 1941, rhizopus rot was more prevalent than cladosporium rot but the percentage affected per car was lower. The 2 were of nearly equal importance. Fusarium rot was noted in 3 carlots.

For the entire period as a whole rhizopus rot was first and alternaria rot second in importance. Fusarium rot (more carlots but less decay per carlot) and cladosporium rot (greater decay per carlot but fewer carlots) followed with about equal importance. Phytophthora rot was of least importance. Decay per car caused by each of these individual organisms, averaged for the 4 years, ranges from 4.3 to 9.2%.

Different rots were found together in each of 206 carlots during the 4 years. Basing the computation on the presence of a given decay either alone or in association with another rot, it was determined that for all 876 carlots in which decay was present, rhizopus rot occurred in 61%, alternaria rot in 30%, fusarium rot in 18%, cladosporium rot in 11%, and phytophthora rot in less than 1%.

The number of carlots in which mold occurred alone (in Honey Ball and mixed melons combined) ranged in number from 14 in 1933 to 60 in 1935 and totalled 141 or 5.8% of all carlots for the 4 years. From 4.6 to 9.0% of the melons were affected per carlot with an average of 6.7% for the 4 years.

The number of carlots in which mold was found associated with decay (in Honey Ball and mixed melons combined) varied from 49 in 1933 to 139 in 1934 and totalled 382 or 15.8% of the carlots inspected during the 4 years. The extent to which it so occurred was 14.7% of the melons in 1933, 13.8% in 1934, 7.1% in 1935, 7.6% mixed melons in 1941 and 13.5% of Honey Ball melons in 1941.

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[6] See Footnote 4.

The average percentage of melons affected with mold and with decay respectively is summarized in Table 2. Decay was a greater spoilage factor than mold during 1933 and (in Honey Ball melons) during 1941. For the 4 years as a whole spoilage was noted in somewhat less than half of the 2415 carlots. In these carlots 4.8% were affected with decay and 5.3% with mold. Expressed in another way 2.1% of Honey Ball and mixed melons combined were affected with decay and 2.2% with mold, a total of 4.3% for the 2 years.

INSPECTIONS OF 1922-28, INCLUSIVE

Methods. The information obtained from the melon inspections of 1922-28, inclusive, was secured from a set of abstracts that had previously been prepared for several commodities by members of the Bureau of Plant Industry and that were based upon certificates filed in Washington by the Agricultural Marketing Administration. The abstracts were believed to cover practically all receiving-point inspections of cantaloups and Honey Dew melons made throughout the United States during the period under discussion.

Throughout the course of these earlier inspections few references were made to the occurrence of mold. Only decay, therefore, has been listed in the summary tables.

Results -- Cantaloups. The data presented in Tables 5 and 6 summarize 3380 cantaloup inspections. Approximately one-half of the carlots originated in California and 84% in the 6 States of Arizona, Arkansas, California, Colorado, New Mexico, and Texas.[7]

Of all 3380 inspections, 748 were made at Cleveland, 342 at New York City, 211 at St. Louis, 190 at Pittsburg, 185 at Chicago, 127 at Boston, 107 at New Orleans, and 102 at Philadelphia. The remaining 1368 inspections were made at 47 different markets, only 12 of which were represented by more than 50 carlots apiece. This distribution does not parallel that of total cantaloup unloads, for according to mimeographed reports by the Agricultural Marketing Service, New York City unloads were regularly much greater than those of any other market, whereas Chicago, Philadelphia, Pittsburg, Cleveland, Detroit, and St. Louis in the order named followed New York City in number of all muskmelon unloads.

From the data in Table 5, it will be noted that less than half of the total decay has been recorded under specific rots. Of these fusarium rot was consistently of greatest importance and occurred in approximately two and one-half times as many carlots as did all other specifically-named rots combined. Cladosporium rot was next in importance. Bacterial

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[7] According to mimeographed reports issued by the Agricultural Marketing Service, shipments of all types of muskmelons (most of which were cantaloups) from all states totalled nearly 200,000 carloads for the period of 1922-28, inclusive. Cantaloups inspected at receiving-point cities thus represented 1.7% of total muskmelon shipments.

Table 5.

Decay in carlots of cantaloups, 1922-28, inclusive

YEAR	TOTAL NUMBER OF CARLOTS INSPECTED	CARLOTS WITH DECAY: Alternaria Rot		Bacterial Soft Rot		Cladosporium Rot		Fusarium Rot		Rhizopus Rot		Unclassified and mixed decays		TOTAL OF ALL DECAYS	
		Number of carlots	Average per-centage of decay	Number of carlots	Average per-centage of decay	Number of carlots	Average per-centage of decay	Number of carlots	Average per-centage of decay	Number of carlots	Average per-centage of decay	Number of carlots	Average per-centage of decay	Number of carlots	Average per-centage of decay
1922	385	6	13.8	7	19.3	6	17.8	27	11.5	--	--	52	14.8	93	14.4
1923	321	3	5.3	1	50.0	5	18.4	37	6.2	--	--	40	10.0	86	9.2
1924	471	1	trace	--	--	2	47.5	19	4.9	5	4.4	28	8.4	55	8.1
1925	590	5	trace	15	10.7	7	24.9	43	7.1	3	21.0	55	13.1	128	11.1
1926	593	5	6.2	--	--	4	3.8	29	8.1	--	--	57	10.1	95	9.0
1927	729	4	9.0	--	--	--	--	23	11.3	--	--	58	5.6	85	7.3
1928	291	1	2.0	--	--	3	9.0	32	12.4	--	--	28	5.0	64	8.8
Total or Average	3380	25	6.7	23	15.0	27	18.9	210	8.7	8	10.6	313	9.9	611	10.0

soft rot was recorded during 3 seasons, in large amount in 1925. Although found in fewer carlots than alternaria rot the percentage affected per car was much higher. Rhizopus rot was noted during 2 seasons.

A summary of total decay arranged by States where the cantaloups originated is presented in Table 6. In general, the smaller the number of carlots inspected, the greater was the proportion of those affected with decay. The amount of decay per car was high in the carlots from all States with the exception of Colorado and Arizona. For the 7-year period as a whole, decay was noted in somewhat less than 1/5 of the carlots with an average of 10% of the melons affected per carlot. Expressed in terms of total melons inspected 1.8% were affected with decay.

Results -- Honey Dew Melons. The results of 574 inspections of Honey Dew melons are summarized in Tables 6 and 7. On the basis of mimeographed reports issued by the Agricultural Marketing Service it is estimated that these represented between 1.5 and 2% of all carlots shipped during the period.

Of all 574 inspections, 211 were made at Cleveland, 77 at Chicago, 36 at New York City, 25 at St. Louis, 22 at New Orleans, and 21 at Boston. The remaining 182 were made at 27 other markets, only 8 of which were represented by 15 or more carlots apiece. As with cantaloups the geographical distribution of carlots inspected does not parallel that of total unloads.

From Table 7 it will be noted that of the 3 specific decays for which data are presented, fusarium rot was the most prevalent, followed in order by order by alternaria rot and anthracnose rot. The percentage affected per car was lowest for fusarium rot. Approximately two-thirds of the carlots with decay are listed under unclassified and mixed decays.

The summary in the second section of Table 6 shows that the percentage of decay in the carlots affected was high from all States, although those from California showed the lowest amount. Decay was present to the amount of 12.5% in these carlots, and on the basis of all 574 carlots an average of 5.8% of the melons were affected.

DISCUSSION

This study of melon inspection certificates begun in 1933 was discontinued after 1935. When the work was taken up later it appeared more desirable to include the inspections of a more recent year than to continue with those of 1936.

With the exception that cladosporium rot and phytophthora rot were not reported before 1935 and that alternaria rot was unreported in 1941, the same decays were found prevalent during the 4 years. Their relative importance was much the same for all types of melons included in the study.

Combining the data in Tables 1, 3, and 4, it will be seen that decay occurred in 3822 carlots or 38.6% of the total inspected. The average incidence of decay per carlot in those affected with rhizopus rot was 4.5%, in those with fusarium rot 5.5%, in those with phytophthora rot 5.7%, in those with alternaria rot 6.7%, in those with cladosporium rot

Table 6.
Summary of decay in carlots of Cantaloups and Honey Dew melons, 1922-28, inclusive

STATE OF ORIGIN	TOTAL CARLOTS INSPECTED		CARLOTS WITH DECAY		CARLOTS WITH NO DECAY
	Number	Average Percentage of decay	Number	Average Percentage of decay	Number
Cantaloups					
Arizona	385	0.3	44	3.0	341
Arkansas	203	1.6	32	10.4	171
California	1750	0.9	212	7.4	1538
Colorado	292	1.7	55	0.9	240
Delaware	35	10.3	30	12.0	5
Georgia	26	18.5	20	24.1	6
Illinois	94	4.3	34	11.8	60
Indiana	77	3.1	27	8.8	50
Maryland	31	8.2	18	14.2	13
New Mexico	37	3.1	12	9.7	25
North Carolina	24	11.5	19	14.5	5
Ohio	95	2.1	18	11.0	77
Texas	151	1.3	24	7.9	127
Other States or unrecorded	177	5.9	66	15.9	111
Total or Average	3380	1.8	611	10.0	2769
Honey Dew Melons					
Arizona	68	4.8	28	11.7	40
California	268	3.2	109	8.0	159
Colorado	149	9.3	94	14.8	55
Other States or unrecorded	89	8.6	37	20.6	52
Total or Average	574	5.8	268	12.5	306

7.5%, and in those with unclassified decay 5.9%. Considering both the number of carlots and the percentage of decay per carlot it was determined that rhizopus rot was responsible for approximately 40% of the total decay that was found in the 3822 carlots, alternaria rot for 25%, fusarium rot for 17%, cladosporium rot for 12%, phytophthora rot for 2%, and undetermined rots for 4%.

As already pointed out several different rots were in many instances found associated in the same carlot. Taking into consideration, then, the occurrence either alone or in association with other rots, of the total 3822 carlots in which decay was present, rhizopus rot was found in 60%, alternaria rot in 26%, fusarium rot in 22%, cladosporium rot in 12%, phytophthora rot in 3%, and unclassified rots in 3% of the carlots.

Table 7.
Decay in carlots of Honey Dew melons, 1922-28, inclusive

YEAR	TOTAL NUMBER OF CARLOTS INSPECTED	CARLOTS WITH DECAY: Alternaria Rot		Anthracnose Rot		Fusarium Rot		Unclassified and mixed decays		TOTAL OF ALL DECAYS	
		Number of carlots	Average percentage of decay	Number of carlots	Average percentage of decay	Number of carlots	Average percentage of decay	Number of carlots	Average percentage of decay	Number of carlots	Average percentage of decay
1922	22	3	1.7	--	--	2	1.0	5	9.6	10	5.5
1923	14	--	--	3	37.3	1	10.0	8	37.5	12	35.2
1924	48	--	--	1	40.0	2	43.5	11	8.6	14	15.8
1925	63	7	3.3	--	--	2	2.5	15	15.1	24	10.6
1926	139	11	25.4	1	28.0	5	5.0	62	10.4	79	12.1
1927	191	8	22.3	7	9.7	12	9.9	50	11.4	77	12.1
1928	97	6	22.5	--	--	14	5.6	32	8.9	52	9.6
Total or Average	574	35	17.1	12	20.7	38	8.6	183	11.9	268	12.5

Mold was found associated with decay in a total of 1207 carlots (12.2% of total carlots inspected) with an average of 13.7% of the melons affected. Nearly three-fourths of the total mold associated with decay occurred in the carlots of cantaloups; very little was found in the carlots of Honey Dew melons inspected.

Mold occurred alone in a total of 578 carlots with an average of 7.5% of the melons affected per carlot. Here again nearly three-fourths of the mold was in carlots of cantaloups while those of Honey Dew melons had very little.

Either mold, or decay, or both, were found in 4400 carlots or 44.5% of the total 9890 carlots inspected (Table 2). In these 4400 carlots, 4.7% of the melons were affected with decay and 4.8% with mold, or a total of 9.5%. Considered in another way 2.1% of all melons inspected were affected with decay and 2.1% with mold, or 4.2% total for both defects.

The presence of mold or decay on a melon does not necessarily indicate that the melon is unfit for food. Much depends of course upon the number of areas affected and their size, in other words the extent to which the melon is damaged. Mold of course is much less important than decay in that it is confined to the surface and in fact constitutes little more than a blemish. This is particularly true where it occurs only to a slight extent and where it is found at the stem scar. In such cases it can readily be removed with the hand. Much of the mold reported was of this nature. Decay, even when found affecting only a small portion of the melon, is a much more serious defect. The presence of decay at the time of unloading indicates the likelihood of further spoilage before the melons reach the consumer.

Although the kind of mold observed was not reported on the certificates, the writer found on the New York market that during the years covered by this study cladosporium mold was by far the most important.

The identity of the fungi responsible for decay is not given in the inspection reports, although the genera to which they belong is readily apparent from the common names used for the decays both on the certificates and in the present publication. Information on the species ordinarily involved may be found in the writer's summary of melon decays already referred to [8].

The writer, although in no way responsible for the work of the inspectors, was in close contact with them during the period of 1933 to 1941 inclusive, and from time to time observed much of the inspection activities at the melon-unloading piers.

The inspections of 1922-28, as pointed out above, were of an entirely different nature and are not directly comparable to those of 1933-35 and 1941. By combining the totals for both cantaloups and Honey Dew melons (Table 6) it was determined that decay occurred in 879, or 22.2% of all carlots inspected, with an average of 10.7% of the melons affected per carlot; and on the basis of all carlots inspected decay averaged 2.4%.

8/ See Footnote 3.

SUMMARY

An analysis was made of the information on mold and decay reported in 9890 carlots of melons that were inspected at New York City during 1933, 1934, 1935 and 1941. These included 3294 carlots of cantaloups, 4181 of Honey Dew melons, and 2415 of Honey Ball and mixed melons combined. All originated in Arizona, California, or Colorado and together constituted approximately one-half of the melons that were unloaded at New York City from those States during the 4 years.

A summary of the different kinds of decay and mold has been presented in tabular form by years for each type of melon.

Specific decays cited on the inspection reports were, in order of their relative importance, rhizopus rot, alternaria rot, fusarium rot, cladosporium rot, and phytophthora rot.

Decays or molds, or both, were found in 4400 carlots. An average of 4.7% of the melons in these cars were affected with decay and 4.8% with mold. Expressed in terms of all 9890 carlots, 2.1% of all melons inspected were affected with decay and 2.1% with mold, or 4.2% total spoilage.

The results of 3380 inspections of cantaloups and 574 of Honey Dew melons made at a large number of markets during the period of 1922-28 inclusive, have likewise been summarized. The melons originated in a number of States and represented only a very small part of the melons shipped from these States to the inspection markets during that period. Decay was reported in 879 carlots or 22.2% of the total inspected. An average of 10.7% of the melons were affected per carlot. Expressed in terms of all 3380 carlots, an average of 2.4% of the melons inspected were reported decayed.

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